APPENDIX A

CHEMICAL/RADIATION EVENT EMERGENCY PLAN ADDENDUM

COUNTY GENERAL HOSPITAL

1997

CHEMICAL/RADIATION EVENT EMERGENCY PLAN ADDENDUM

TABLE OF CONTENTS

COUNTY GENERAL HOSPITAL
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I. OBJECTIVES - CHEMICAL/RADIATION EVENT PLAN

The purpose in developing this procedure is to ensure that the staff of County General Hospital will maintain a high degree of preparedness in the event of a Chemical/Radiation Event Emergency.

Through this plan there is offered protection to life by making maximum use of available manpower, equipment, and other resources during a Chemical/Radiation Event Emergency.

The hospital administration and staff is committed to cooperating with local, state and federal agencies in responding to Chemical/Radiation emergencies, as well as supporting inservice training and drills. Serious medical problems will always have priority over concerns about radiation such as radiation monitoring, contamination control and decontamination. Instructions for chemical contamination events will be followed according to authorities.

II. NOTIFICATION AND VERIFICATION RESPONSIBILITIES

A. FRONT DESK

1. Contact Nursing Supervisor or Emergency Department nurse to receive call.

B. NURSING SUPERVISOR OR EMERGENCY DEPARTMENT NURSE RESPONSIBILITIES

1. Receive information regarding chemical/radiological accident
   a. Number of accident victims
   b. Each victim's medical status
   c. If the victims have been surveyed for contamination
   d. Status of victims EXPOSED versus CONTAMINATED
   e. Identification of contaminant if known
   f. Estimated time of arrival
   g. Advise ambulance personnel of entrance to be used
   h. If accident notification comes from a source other than 9-1-1 or ambulance crew, obtain a call-back number and verify the accident before assembling the Chemical/Radiological Emergency Response Team and preparing for patient admission.

2. Delegate the Front Desk to initiate call for the appropriate personnel (i.e., Chemical/Radiological Emergency Response Team, Trauma Team, Medical Alert Plan, etc.). Contact Administration as appropriate.

3. Delegate the Front Desk to overhead page "Medical Alert, Code Yellow" x 3. Chemical/Radiation Contamination Incident will be designated as "Code Yellow."

4. Notify or delegate Administration to notify appropriate offices:

   County EMS: 842-3412 or 9-1-1

   Chem-Trec: 1-800-424-9300 (Emergency Response Guidebook - ED) (Yellow DOT Book)

State: 1-800-452-0311, or
Radiation Control Section, State Health Division: 1-229-5797
Poison Control: 1-800-452-7165
Federal (DOE - Department of Energy): Call 1-800-452-0311
REAC/TS (Radiation Emergency Assistance Center/Training Site): 423-481-1000, ext. 1502 (8:00-4:30 EST or Beeper #241 on weekends and holidays)

C. Organizational Chart (see page 4)

III. CHEMICAL/RADIATION HAZARDS EMERGENCY RESPONSE TEAM

A. TRAUMA TEAM

1. NURSING SUPERVISOR
   a. Lead, advise, and coordinate the facility
   b. Notify appropriate State and/or Federal agencies
   c. Assume duties of Administration until their arrival
   d. Communicate with Administration for coordination
   e. Ensure communication with family members

2. EMERGENCY DEPARTMENT NURSE (Triage) (team coordinator)
   a. Lead, advise and coordinate E.D.
      (1) Assist with preparation of the Chemical/Radiation Emergency Area(C/REA)
      (2) Assume primary responsibility in caring for the chemical/radiation accident victim(s)
   b. LIMIT PERSONNEL in area; define roles before patient arrival. No pregnant personnel in area.
   c. Assume duties of Nursing Supervisor until his/her arrival

3. EMERGENCY DEPARTMENT PHYSICIAN (Triage) (team coordinator)
   a. Diagnose, treat, provide emergency medical care

4. LABORATORY
   a. Obtain or receive lab specimens that need to be run immediately

5. RADIOLOGY
   a. Operate portable unit as needed
   **b. Monitor and document for radiation events
   c. Obtain survey equipment if Radiation Safety Officer (RSO) or Nuclear Medicine technician not available.

6. RESPIRATORY THERAPY/E.K.G.
   a. Provide routine patient care as needed

7. ADDITIONAL EMERGENCY DEPARTMENT NURSES
   a. Assist with preparation of C/REA
   b. Assist with medical procedures
   c. Collect specimens
   d. Assist with decontamination
   e. Assess patient's needs and intervene appropriately

B. ADDITIONAL PHYSICIANS AS NEEDED

1. Diagnose, treat, and provide emergency medical care

C. EMTs (AS AVAILABLE)

1. Assist with medical procedures

2. Assist with documentation

D. TECHNICAL RECORDER (Medical records and/or Patient Business Office person)

1. Record admitting and medical data

**E. RADIATION SAFETY OFFICER (Radiologist and/or Nuclear Medicine technician)

1. Monitor patient and area

2. Advise on contamination and exposure control

3. Maintain survey equipment

F. ADMINISTRATION (President, Vice President, and/or Vice President of Patient Services

1. Notify appropriate Local, State and/or Federal agencies. (See pages A-1,2.)

2. Coordinate hospital responses

3. Assure ongoing hospital operations

4. Public information officer
   a. Releases information to public media

5. Coordinate all equipment, blood products, and supplies as needed.

G. PLANT SERVICES MANAGER (or designee)

1. Maintenance
   a. Set up contamination control areas
      (1) Bring "Chemical/Radiation Decontamination cart" to Emergency Department Lobby (kept in basement oxygen storage room)
      (2) Prepare Chemical/Radiation Emergency Area (C/REA)
   b. Deliver appropriate supplies

2. Housekeeping/Laundry
   a. Deliver appropriate linens and supplies
   b. Assist with area contamination control setup

3. Security personnel
   a. Secure chemical/radiation emergency area
   b. Secure hospital entrances
   c. Control crowds

H. PURCHASING

1. Bring “Chemical/Radiation Decontamination Box” with supplies to Emergency (box kept in Purchasing).

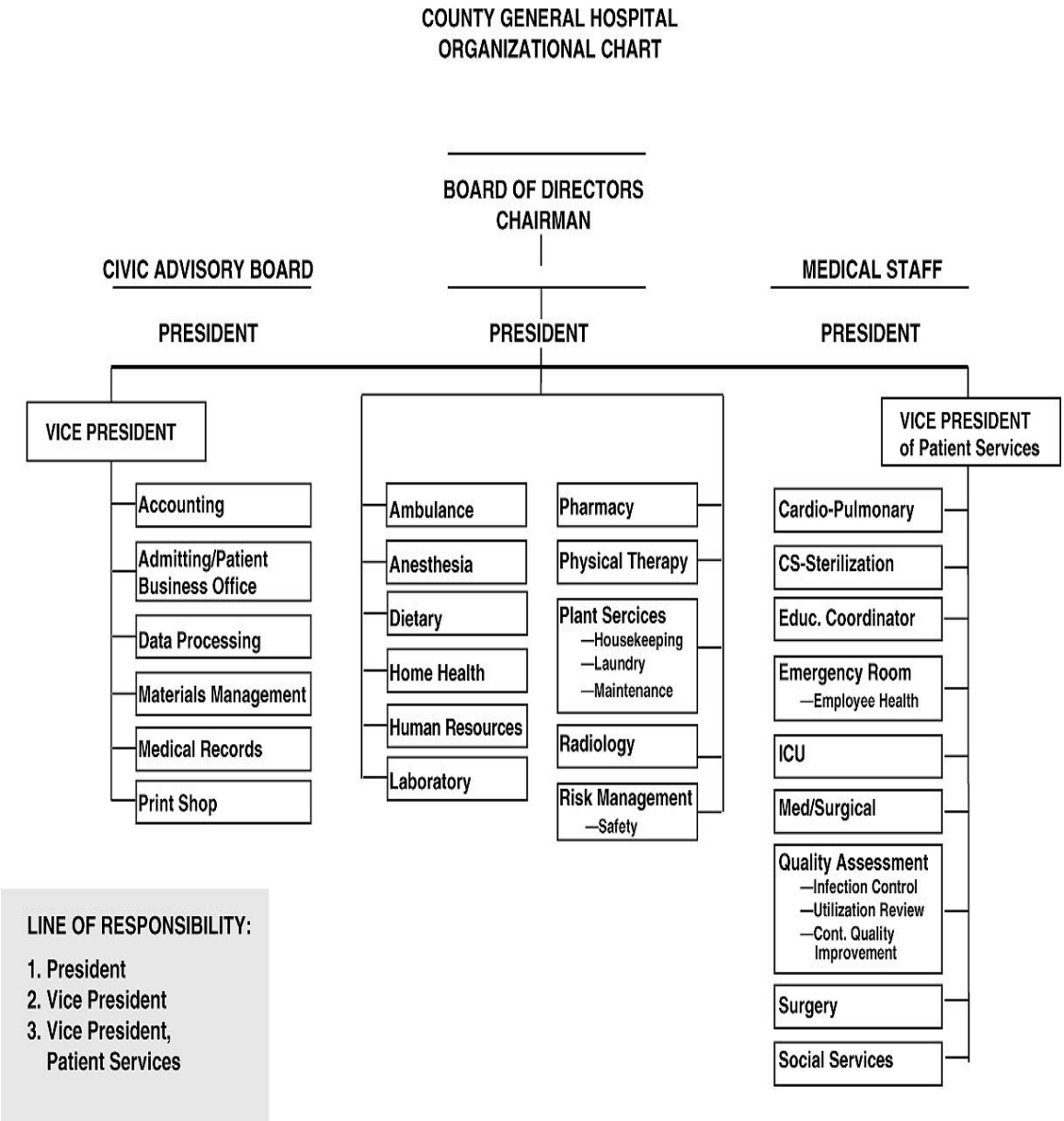
2. Be available for additional needed supplies

I. FRONT DESK

1. Route all accident related calls to administrative person or designee

2. Supply additional personnel to handle paper work and/or phones

COUNTY GENERAL HOSPITAL ORGANIZATION CHART



IV. PREPARATION OF CHEMICAL/RADIATION EMERGENCY AREA (C/REA)

A. DECONTAMINATION AREA

1. Attach hose to faucet in Laundry; run hose out to back parking lot. (Plant Services)

2. Place large empty water container (wading pool) with drain hose in decontamination area (Plant Services)

3. Direct hose into drain (Plant Services)

4. Screen off decontamination area for privacy if possible (Plant Services)

B. HOSPITAL ENTRANCE TO TRAUMA ROOM

1. Cover floor and/or ground from ambulance or transport vehicle to trauma room, or appropriate area, with 3-4 foot wide brown paper, butcher paper, or other appropriate material – ½ width of walkway (Plant Services)

2. Securely tape paper with 2 inch masking tape (Plant Services)

3. Cover door handles and light switches (Plant Services)

4. Access to area LIMITED and controlled by security officers (Plant Services)

C. TRAUMA ROOM (Bed #4, unless otherwise designated)

1. Remove all unnecessary equipment, supplies (Plant Services/E.D. personnel)
   a. Remove regular bed or table if different stretcher to be used

2. Remove patients and/or non-essential personnel (E.D. personnel)

3. Cover remaining equipment and/or supplies with sheets or plastic (Plant Services and Emergency Department Staff)
   a. Cover door handles and light switches (Plant Services)

4. Cover floor of C/REA (all treatment areas) with 3-4 foot wide brown paper, butcher paper, or other appropriate material (Plant Services)

5. Securely tape paper with 2 inch masking tape (Plant Services)

6. Rope off area and mark “Chemical/Radiation Area” (Plant Services)

7. Mark floor with tape to designate contaminated versus clean area (Plant Services)

8. No eating or drinking in C/REA (All Personnel)

9. Access to C/REA limited and all entrances/exits controlled by security personnel or locked doors (Plant Services)

10. Post “No pregnant” signs at all appropriate entrances.

D. EQUIPMENT AND SUPPLIES (found in E.D., Purchasing, Plant Services, Housekeeping, and Radiology)

1. Chemical/Radiation Decontamination Cart (Plant Services)
   a. Bleach (sodium hypochlorite) (1 quart)
   b. Boraxo - powdered (2 boxes)
   c. Lava Soap (2 bars)
   d. Lead pigs (8 small)
   e. Sheets for equipment drapes (10)
   f. 2" masking tape (2 rolls)
   g. Barrier standards with rope (4)
   h. Large trash bags (10)
   i. Small trash bags (10)
   j. Small ziplock bags (10)
   k. Large ziplock bags (10)
   l. Clipboards with anatomical charts (5)
   m. Wax or felt pens (6)
   n. Skin markers (5)
   o. Signs "RADIATION AREA" (6)
   p. Signs "No Pregnant" (6)
   q. Large bio-medical boxes with liners (6)
   r. Radioactive labels
   s. "D" Batteries (4)

2. Chemical/Radiation Contamination Box (Purchasing)
   a. .9 Na Cl - 1000ml (1 case)
   b. Sterile H_20 - 1000ml (1 case)
   c. 2" tape (6)
   d. Isolation Gowns (1 case)
   e. Head covers (1 case)
   f. Gloves (1 case)
   g. Shoe covers (1 case)
   h. Mild soap
   i. Shield, mask/eye (1 case)
   j. Large disposable drapes (5)
   k. Bi-citra 30cc/water - 30cc

3. Supplies in E.D.
   a. Culture swabs in plastic bags (20)
   b. Trash cans with plastic liners
   c. Surgical scrub soap
   d. Soft scrub brush
   e. 3% hydrogen peroxide

4. House cleaning supplies
   a. Linen (sheets, blankets, towels, patient gowns)

5. May place instruments inside plastic bag to ensure they do not become contaminated.

E. EMERGENGY MEDICAL SUPPLIES

1. Code Cart

2. Suction, oxygen, I.V. solutions, etc.

**F. RADIATION SURVEY EQUIPMENT (Radiation Safety Officer)

1. Ludlum G-M survey meter or other equivalent multi-range survey meter (Nuclear Medicine)
   a. Cover probe with rubber glove

2. Ionization chamber/Dose Calibrator (remains in Nuclear Medicine)

3. Dosimeters (when available)

4. Alpha detector (optional)

G. HOSPITAL FLOOR PLAN (see page A-9)

V. PREPARATION OF CHEMICAL/RADIOLOGICAL EMERGENCY RESPONSE TEAM

A. PROTECTIVE CLOTHING

1. Don protective clothing before patients arrive

2. Wear scrub suit, isolation gown, surgical hoods or head covers, masks, gloves, eye covers, and waterproof shoe covers

3. All open seams and cuffs should be taped with masking tape (2")

4. Two (2) pairs of surgical gloves must be worn
   a. First pair taped to gown
   b. Second pair easily removable (replace if they become contaminated)
   c. Three (3) pairs may be worn for added protection if you wish

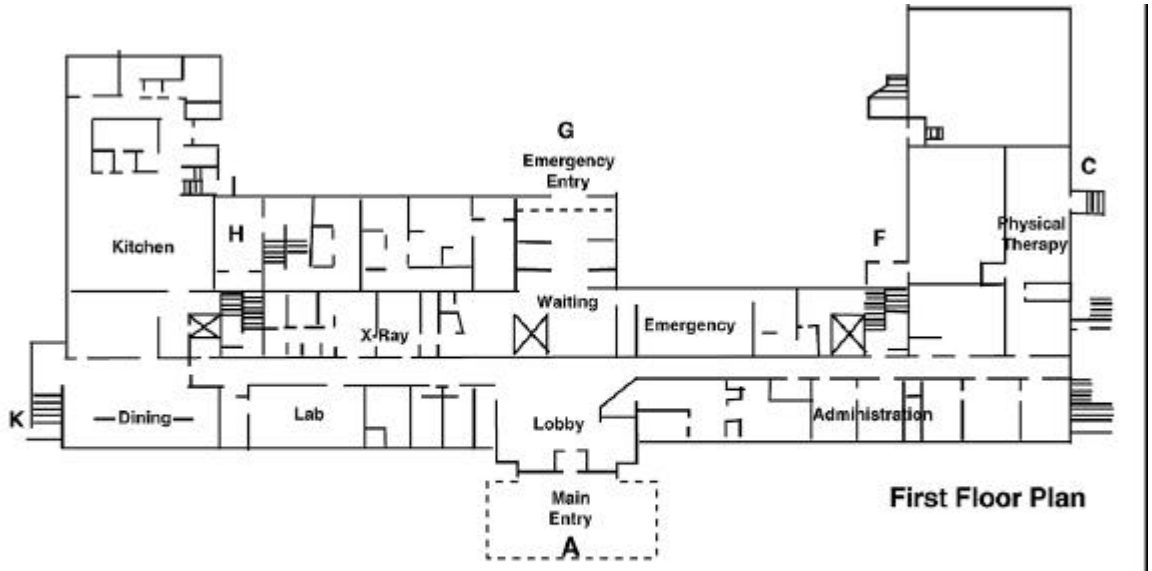
**5. Film badges if available

**6. Radiation dosimeter assigned to each team member (when available)
   a. Attach to outside of gown at the neck for easy removal and readings
   b. Dosimeters should be read every 15 to 20 minutes by the RSO or designee
      (1) Document individual readings
      (2) Persons reading above 100 mR/hr. should leave the area as soon as possible following proper exiting procedure

B. ANATOMICAL READING FORM (see page A-10)

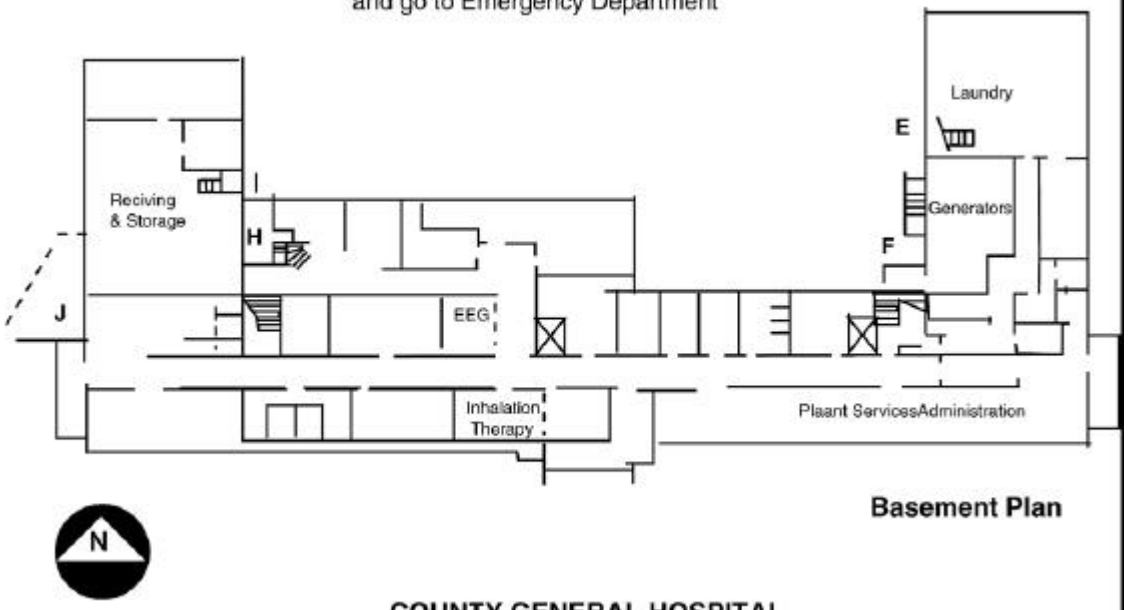
C. DOSIMETER READING FORM (see page A-11)

COUNTY GENERAL HOSPITAL FLOOR PLAN GRAPHIC



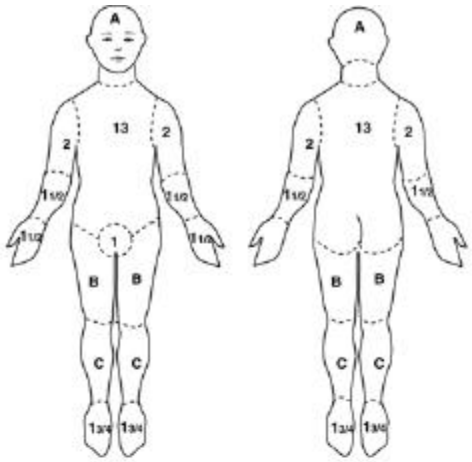
1" = 40' 0"

- Single patient to enter through "Exit F" and go to Emergency Department, Bed 4
- Multiple patients to enter through "Exit G" and go to Emergency Department



COUNTY GENERAL HOSPITAL
FLOOR PLAN

ANATOMICAL RECORD FORM



Anatomical Record Form

Date	Time	Reading	Body Location	Treatment, etc.

DOSIMETER LOG TABLE

DOSIMETER LOG

Should be read every 15 minutes

Date	Time	Name	Dosimeter #	Dosimeter Reading	Date/Time Dosimeter Use Do'd	Final Reading

VI. CARE OF THE CHEMICAL/RADIATION ACCIDENT PATIENT ON ARRIVAL

A. PATIENT ARRIVAL AND TRIAGE

1. Meet patient at transport vehicle after donning protective clothing

2. Assess ABC's: perform necessary life-saving measures. Follow instructions given by authorities.

3. Assess type of chemical/radioactive contamination (Radiation: See Lethal Dose, page A-23)
   a. Whole or partial body exposure - no contaminant contact
      (1) Exposure from an external source
      (2) Patient is NOT a hazard to attendants
   b. Internal contamination by inhalation or ingestion
      (1) Contamination caused by airborne exposure
      (2) Patient is NOT a hazard to attendants once clothing is removed and skin is decontaminated
   c. External contamination of body surface
      (1) Contamination by liquids or dirt
      (2) Patient IS a hazard to attendants until decontaminated
   d. External contamination complicated by wounds
      (1) Patient IS a hazard to attendants until decontaminated
      (2) Patient is considered to also have internal contamination

**4. Brief radiological survey performed with survey meter to determine if patient contaminated (See Table I - "How to Survey a Patient for Contamination," page A-19)
   a. Done only if patient condition allows
   b. Readings two (2) times above background determine possible contamination (TCGH background is .3 mR/hr.)
      (1) Record findings (Use Anatomical Record Form, page A-10)
         (a) Non-contaminated patients proceed for regular care
         (b) Contaminated patients proceed with decontamination procedure

5. Responsibilities of transport crew
   a. Remove patient's clothing in or near transport vehicle
      (1) Wrap and/or cover patient with two (2) clean sheets or blankets
         (a) Clothing should have been removed at incident scene if transported by ambulance
      (2) Assist hospital staff with decontamination and/or placing on clean receiving stretcher.
      (3) If patient positive for contamination, follow guidelines for care of contaminated material
         (a) Place clothing in plastic bag-lined bio-medical waste container (label "CONTAMINATED")
         (b) Place all contaminated materials (i.e., bedding, blood, urine, jewelry, dentures, belts) from the ambulance in plastic bag-lined bio-medical waste container (label "CONTAMINATED")
         (c) Save for examination by appropriate authorities or by Radiation Safety Officer (RSO)
            1) DO NOT DISCARD

6. Transport crew to remain with vehicle until released by RSO

B. DECONTAMINATION OF THE UNINJURED AND/OR NON-CRITICAL PATIENT

1. Reassure and explain procedures to patients.

2. Transfer patient to decontamination area (outdoors if possible).

3. a. Decontaminate outdoors if appropriate.
   b. Survey or assess patient (use survey meter if radiological)
   c. Document (Record results on Anatomical Record Form, page a-10.)
   **d. Decontaminate if reading more than two (2) times background (TCGH background is .3 mR/hr.) (300 microrads/hr.)
      (1) Avoid getting fluids in the ears, eyes, nose or mouth
      (2) Hose patient down with lukewarm water - Resurvey - Document
         (a) A shower may be used if feasible
         (b) Use clean towels after each shower or hosing
         (c) Place all materials used in a plastic bag lined bio-medical waste container (label "CONTAMINATED")
         **(d) Survey after each shower - Document
      **(3) Continue with progressive decontamination and patient treatment in the C/REA if survey readings remained unchanged after five (5) washings with water

4. Proceed to C/REA
   a. Assess level of consciousness and record vital signs
      (1) Note allergies, medications
      (2) Any history of illnesses
      (3) Any recent nuclear medicine studies
      (4) Complete physical exam
      (5) Pregnant?
   b. Collect appropriate samples
      (1) Collect CBC with differential and UA for baseline (See Table II, pages A-20, 21)
         (a) Cleanse area thoroughly before venipuncture with soap and water followed with alcohol or betadine
   **c. External contamination monitoring
      (1) Survey with survey meter - Document (Use Anatomical Record Form, page A-10)
         (a) Mark areas of highest contamination with skin markers
      (2) Moisten swabs with water and collect samples from body orifices, wounds, and skin
         (a) Seal each swab in its own plastic container
         (b) Label each swab with name, date, time, and site
         **(c) Survey each swab and record findings
         **(d) Bag and store swabs (label "Contaminated")
         **(e) RSO will conduct final survey of swabs. Do not discard.

5. Localize area of contamination with plastic sheet and/or drape. Tape to prevent further contamination.

6. Decontaminate wounds and body orifices first and highest contaminated intact skin second (assume internal contamination if wound contaminated (See Internal Contamination, page A-16)
   a. Open Wounds (AVOID CROSS-CONTAMINATION - Never dip cleansing instrument into cleaning agent, pour or shake)
      (1) Chemical: Decontaminate as appropriate protecting other areas
      **(2) Radiation:
         **(a) Drape area with waterproof drapes and irrigate with saline, sterile water or Hydrogen peroxide

**(b) Blot dry, remove contaminated material (retain material for further survey
**(c) Resurvey - Document results on same Anatomical Record
**(d) If contamination level remains high after repeated cleansing, surgical debridement should be considered (retain tissue for assessment)
**1) Use fresh cleaning materials after each cleansing
**2) Change cleaning agents frequently if highly contaminated area
**(e) Cover decontaminated wounds with waterproof dressing
**(f) Continue with decontamination of other areas
**(g) Delay suturing until patient moved to a decontaminated area

b. Body Orifices
(1) Chemical: Decontaminate as appropriate
**(2) Radiation:
**(a) Brush teeth and rinse mouth with 3% citric acid solution (Bi-citra 15cc/H_20 15cc - 3% solution)
**(b) Gargle with 3% Hydrogen peroxide for pharyngeal contamination
**(c) Rinse eyes and nose with tap water or saline
**1) Irrigate with copious amounts of water
**2) Change to normal saline as soon as possible
**(d) Treat irrigation induced conjunctivitis as usual
**(e) Survey irrigation fluid at frequent intervals and record results
(3) Irrigate ears with water or normal saline, using an ear syringe if tympanic membrane is intact

c. Contaminated Skin
(1) Chemical: Decontaminate as appropriate
**(2) Radiation:
**(a) Wash area gently under a stream of warm water while scrubbing with a soft brush or sponge
**1) Do not abrade skin or cause erythema
**2) Pat dry
**3) Resurvey - Document results on Anatomical Record (see page A-10)
**4) Proceed with more progressive cleaning if still contaminated
**(b) Progressive cleansing agents
**1) Mild soap or surgical scrub soap
**2) Sodium hypochlorite or household bleach
**3) Abrasive soap (i.e., Lava)
**4) 3% Hydrogen peroxide solution
**5) Shampoo
**(c) Following removal of contamination, apply cream and cover area
**(d) Survey - Document results on same Anatomical Record (see page A-10)
**1) Record documentation following each cleansing

d. Internal Contamination
(1) Chemical: Decontaminate as appropriate
**(2) Radiation:
**(a) Secure appropriate samples (See Table II, pages A-20, 21)
**(b) Proceed with Internal Contamination antidote (See Table III, page A-22)
**(c) Patient admitted with an airway or ET tube is considered to be internally contaminated (no special equipment or procedures are needed for ventilator)
**(d) Save all body wastes for assessing amount of radio-active materials present
**1) Used to determine total radiation dose received
**2) Used to determine appropriate therapy

7. Follow procedure for “Internal Contamination” for patients having inhalation or ingestion contamination

8. Transfer patient out of C/REA when contamination as low as possible and patient treated and stable
   a. See "Transfer of Patient From the Chemical/Radiation Emergency Area", page A-17

9. Place all materials used (i.e., drapes, dressings, linen, sharps containers, miscellaneous supplies, etc.) in plastic bag-lined bio-medical boxes (label "CONTAMINATED"). Do not discard sample.
   a. See "Decontamination of the Chemical/Radiological Emergency Response Team," page A-18)

10. Documentation (See "Documentation" requirements, page A-17)

C. DECONTAMINATION OF THE CRITICAL PATIENT (Life Threatening)
1. Perform life-saving functions

2. Transfer to clean, waterproof draped stretcher prior to entering facility and C/REA. Cover patient with clean sheets or blankets.

3. a. Decontamination in chemical/radiation Emergency Area
   b. Survey or assess as patient condition allows
   c. Document (Record results on Anatomical Record Form, page A-10)
   d. Decontaminate gross chemical contaminate as appropriate.
   **e. Decontaminate if background reading more than two (2) times background (TCGH background is .3 mR/hr.)

4. Proceed to C/REA
   a. Assess level of consciousness and record vital signs
      (1) Note allergies, medications
      (2) Any history of illnesses
      (3) Any recent nuclear medicine studies
      (4) Complete physical exam
      (5) Pregnant?
   b. Collect appropriate samples
      **(1) (Table II, pages A 20, 21) - Collect CBC with differential and UA for baseline
         (a) Cleanse area thoroughly before venipuncture with soap and water followed with alcohol or betadine
   **c. External contamination monitoring
      (1) Survey with survey meter - Document (use Anatomical Record Form, page A-10)
         (a) Mark areas of highest contamination with skin marker
      (2) Moisten swabs with water and collect samples from body orifices, wounds, and skin
         (a) Seal each swab in its own plastic container
         (b) Label each swab in its own plastic container
         **(c) Survey each swab and record findings
         **(d) Bag and store swabs (label "CONTAMINATED")
         **(e) RSO will conduct final survey of swabs. Do not discard.

5. Localize area of contamination with plastic sheet and/or drape, tape to prevent further contamination

6. Decontaminate wounds and body orifices first and highest contaminated intact skin second (assume internal contamination if wound contaminated (see Internal Contamination, page 14)
   a. Avoid getting fluids in the ears, eyes, nose or mouth
   b. Open Wounds (AVOID CROSS-CONTAMINATION - Never dip cleansing instrument into cleaning agent, pour or shake)

(1) Chemical: Decontaminate as appropriate
**(2) Radiation:
**(a) Drape area with waterproof drapes and irrigate with saline, sterile water or Hydrogen peroxide.
**(b) Blot dry, remove contaminated material (retain material for further survey)
**(c) Resurvey - Document results on same Anatomical Record
**(d) If contamination level remains high after repeated cleansing, surgical debridement should be considered. (Retain tissue for assessment)
**1) Use fresh cleaning materials after each cleansing
**2) Change cleaning agents frequently if highly contaminated area
**(e) Cover decontaminated wounds with waterproof dressing
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d. Contaminated Skin
(1) Chemical: Decontaminate as appropriate
**(2) Radiation:
**(a) Wash area gently under a stream of warm water while scrubbing with a soft brush or sponge
**1) Do not abrade skin or cause erythema
**2) Pat dry
**3) Resurvey - Document results on Anatomical Record (see page A-10)
**4) Proceed with more progressive cleaning if still contaminated
**(b) Progressive cleansing agents
**1) Mild soap or surgical scrub soap
**2) Sodium hypochlorite or household bleach
**3) Abrasive soap (i.e., Lava)
**4) 3% Hydrogen peroxide solution
**5) Shampoo
**(c) Following removal of contamination, apply cream and cover area
**(d) Survey - Document results on same Anatomical Record (see page A-10)
1) Record documentation following each cleansing

e. Internal Contamination
(1) Chemical: Decontaminate as appropriate
**(2) Radiation:
**(a) Secure appropriate samples (See Table II, pages A-20, 21)
**(b) Proceed with internal contamination antidote (See Table III, page A-22)
**(c) Patient admitted with an airway or ET tube is considered to be internally contaminated (no special equipment or procedures are needed for ventilator)
**(d) Save all body wastes for assessing amount of radioactive materials present
**1) Used to determine total radiation dose received

**2) Used to determine appropriate therapy

7. Follow procedure for "Internal Contamination" for patients having inhalation or ingestion contamination

8. Transfer patient out of C/REA when contamination as low as possible and patient treated and stable.
   a. See "Transfer of Patient from the Chemical/Radiation Emergency Area", page A-17)

9. Place all materials used (i.e., drapes, dressings, linen, sharps containers, miscellaneous supplies, etc.) in plastic bag-lined-bio-medical boxes (label "CONTAMINATED"). Do not discard.
   a. See "Decontamination of the Chemical/Radiological Emergency Response Team," pages A-18)

10. Documentation - See "Documentation" requirements, page A-17)

D. TRANSFER OF PATIENT FROM THE CHEMICAL/RADIATION EMERGENCY AREA
   1. Perform final complete body survey before discharge
      a. Thoroughly dry body
      **b. Reswab previous areas and again seal swabs in plastic
         **(1) Label swab with name, date, time, and site
         **(2) Survey and record finding
         **(3) Bag and store swabs (label "POST-CONTAMINATED")
         **(4) RSO performs final survey before discarding or saving.

   2. Lay clean floor covering to patient stretcher and bring in clean stretcher

   3. Clean attendants transfer to clean stretcher

   **4. RSO performs final survey of patient and stretcher (Special attention to wheels) with survey meter - Document

   5. Transfer patient to another location outside of the C/REA

E. CONTAMINATIONED CORPSES
   1. Contaminated corpses will be handled in accordance with state recommendations.

F. DOCUMENTATION
   1. Routine medical records and assessment including question regarding pregnancy.

   **2. Survey readings
      a. Anatomical Record Form (See page A-10)

   3. Samples taken and time

   4. Description of accident

   5. Effectiveness of decontamination

   6. Note pre-existing conditions, rashes, healing wounds, scars

VII. DECONTAMINATION OF THE CHEMICAL/RADIOLOGICAL EMERGENCY RESPONSE TEAM

NOTE: Chemical Emergency Response Team decontamination and exit procedures are same as radiological, except no monitoring, dosimeters, etc.

A. EXITING FROM THE CHEMICAL/RADIATION AREA (C/REA)

1. Each member goes to the control line and removes their protective clothing (one person designated to assist with removal and bagging)
   a. Remove outer gloves first, turning them inside out as they are pulled off
   b. Give Dosimeter to RSO for final reading (if dosimeters were available)
      (1) All practical efforts will be made to reduce personnel exposure to less than 100 mr
   c. Remove all tape at trouser cuffs and sleeves
   d. Remove outer surgical gown, turn inside out (avoid shaking)
   e. Pull surgical trousers off over shoe covers
   f. Remove head cover and mask
   g. Remove shoe cover from one foot and let RSO monitor shoe
      (1) If shoe is clean, step over control line
      (2) Remove other shoe cover and monitor other shoe
      (3) If either shoe contaminated, remove and replace with new shoe cover
   h. Remove inner gloves
   **i. Do total body radiological survey of each team member
      (1) Document and record
      (2) Decontaminate if readings greater than three (3) times background
      (3) Follow same procedure as "Decontamination of the Non-Injured Patient"
   j. Shower and shampoo with soap and water
   (1) If shower outside C/REA, these secondary showers are considered a control area
   k. Final survey
      (1) Personnel dressed in street clothes to report to the control point for a final survey
      (2) Document
   l. Secure and post sign(s) after all personnel exit control area(s)
      (1) Sign: "CAUTION - CHEMICAL/RADIATION AREA"
   **m. All involved personnel will be requested to collect three (3) successive 24-hour urine specimens for analysis of radioactivity

2. All materials removed to be placed in a plastic bag-lined bio-medical box and left in C/REA
   a. Label "CONTAMINATED"
   b. Leave one box near control line for last person

3. Area remains secured until checked and decontaminated by appropriate personnel: RSO or other health physics experts
   a. Radiation Safety Officer - Check with Radiology
   b. Department of Energy (DOE) (for this particular hospital, may be state Radiological Health Agency)

VIII. GENERAL INFORMATION

**A. TABLE I - "HOW TO SURVEY A PATIENT FOR CONTAMINATION"

A patient survey can be done simultaneously with other emergency procedures, provided there is no interference with needed emergency care.

1. Use a low-range survey meter, such as a CD V-700 (may be supplied by EMS or Fire Department. RSO will use the survey meter out of Nuclear Medicine.)

2. Before entering the decontamination room or before patient arrival, perform operational check of instrument and determine background level; open the shield on the probe; cover the probe with a small plastic bag or plastic glove.

3. Set instrument selector switch to the X 1 range (CD V-700) or most sensitive scale of the instrument.

4. When necessary, adjust the range of the instrument by moving the selector switch. Meter readings should not be taken when the dial indicator reads in the lower 10 percent of the scale when on the X 100 and X 10 ranges. Turn the selector switch to the next most sensitive range to measure the exposure rate more accurately.

5. Holding the probe approximately 1 inch from the patient's skin, systematically survey the entire body from head to toe on all sides. Move the probe slowly (about 1 inch per second) and pay particular attention to wounds, orifices, body folds, hairy areas and hands.

6. An increase in count rate or exposure rate above background indicates the presence of radiation.

7. Document time and radiation measurements on an anatomical drawing; each subsequent survey result should be documented.

8. The use of headphones with the CD V-700 facilitates monitoring.

**B. TABLE II - RADIOLOGICAL AND CLINICAL LABORATORY ASSESSMENTS

All samples must be placed in separate, labeled containers that specify name, date, time of sampling, area of samples, and size of area samples. Medical, legal, and other postaccident investigations require that no blood, urine, feces, or other samples taken in the emergency treatment period be disposed of without authorization.

SAMPLES NEEDED	WHY?	HOW?
In all cases of radiation injury:		
CBC and differential STAT (follow with absolute lymphocyte counts every 6 hours for 48 hours when history indicates possibility of total-body irradiation)	To assess the radiation dose; initial counts establish a baseline, subsequent counts reflect the degree of injury	Choose a noncontaminated area for veni-puncture; cover puncture site after collection
Routine urinalysis	To determine if kidneys are functioning normally and establish a baseline of urinary constituents; especially important if internal contamination is a possibility	Avoid contaminating specimen during collection; if necessary, give the patient plastic gloves to wear for collection of specimen; label specimen “Number 1”, with date and time
When external contamination is suspected:		
Swabs from body orifices	To assess possibility of internal contamination	Use separate saline- or water-moistened swabs to wipe the inner aspect of each nostril, each ear, mouth, etc.
Swabs from wounds	To determine if wounds are contaminated	Use moist or dry swabs to sample secretions from each wound, or collect a few drops of secretion from each using a dropper or syringe; for wounds with visible debris, use applicator or long tweezers or forceps to transfer samples to specimen containers which are placed in lead storage containers (pigs)
Skin wipes	To locate contaminated areas	Use filter paper, smear pads, or compresses to wipe sample areas 10cm x 10cm in size.
When internal contamination is suspected:		
Urine: 24-hour specimen x 4 days	Body excreta may contain radionuclides if internal contamination has occurred	Use 24-hour urine collection container

LEGEND: ** = Applies to Radiation only

**B. TABLE II (Continued)

Feces x 4 days	Body excreta may contain radionuclides if internal contamination has occurred	Save excreta in plastic containers in refrigerator or freezer
Vomitus	Body excreta may contain radionuclides if internal contamination has occurred	Save excreta in plastic containers in refrigerator or freezer
Sputum	To assess respiratory tract contamination if inhalation of contaminant was a possibility	Use a 5-percent propylene-glycol aerosol to get a deep cough specimen
Serum creatinine	To assess kidney function if chelation is indicated	Clinical chemistry
Other samples needed:		
All irrigating fluids	Radiological assessment	Save in sealed and labeled, glass or plastic-lined containers

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C. TABLE III - MEDICATIONS AND MECHANISMS OF DECORPORATION (MODIFIED FROM SAFETY SERIES 47, IAEA)

		Applications in		
Radionuclide	*Medication*	*Ingestion/Inhalation*	*Wound*	*Principle of Action*
Iodine	Kl	130 mg (tabl) stat, followed by 130 mg q.d. x 7 if indicated	Same	Blocking
Rare earths Plutonium Transplutonics Yttrium	DTPA	1 gm Ca-DTPA in 500 ml 5-percent D/W i.v. over 60 min; or 1 gm (4ml) in 6 ml 5-percent D/W by slow i.v. injection (1 min)	Irrigate wound with 1 gm of Ca-DTPA in 250 ml D5W	Chelation
Polonium Mercury Arsenic Bismuth Gold	BAL	One ampule (=300 mg) i.m. q4 hrs. for 3 days - (first test for sensitivity with ¼ amp.)	Same	Promotes excretion
Uranium	Bicarbonate	Slow i.v. infusion of bicarbonated physiological solution (250 ml at 14 percent)	Slow i.v. infusion of bicarbonated physiological solution (250 ml at 14 percent) and wash with bicarbonate	Alkalinization of urine; reduces chance of ATN
Cesium Rubidium Thallium	Prussian Blue* (Ferrihexacyano-Ferrate (ll)	1 gm in 100-200 ml water p.o. t.i.d. for several days	Same	Mobilization from organs and tissues - reduction and absorption
Radium	Ca-gluconate	May be tried; 20-percent Cagluconate 10 ml ilv. Once or twice daily	Same	Displacement
Strontium	Ammonium chloride	3 gm t.i.d. p.o.	Same	Demineralizing agent
Tritium	Water	Hae patient drink 6-12 literse of water per day	Same	Isotopic dilution
Strontium Radium	$BaSO_4$	100 gm $BaSO_4$ in 250 ml of water	Same	Reduces absorption
Calcium Barium	Sodium alginate	10 gm in a large glass of water	Same	Inhibits absorption
Copper Polonium Lead Mercury Gold	D-Penicilla-mine	l gm i.v. q.d. or 0.9 gm p.o. 4-6 hours	Same	Chelation

*Not FDA approved as of publication date

LEGEND: ** = Applies to Radiation only

**D. LETHAL DOSE AND ACUTE RADIATION SYNDROME
1. LETHAL DOSE (L.D.)
a. May occur in patient who has received full or partial body external radiation exposure
(1) L.D. 100 in man approximately 800 REM
(2) L.D. 50 in man approximately 400 REM
(a) Definition of L.D. 50 - dose which will produce an acute illness (A.R.S.) followed by death in 30-60 days in 50% of the people thus exposed.
(3) Triage will be necessary if widespread accident, such as in a major nuclear disaster or war attack to segregate patients and keep those exposed to an L.D. 100 comfortable, but save supplies and manpower for persons in which there is some hope for recovery.
(4) Lower doses (L.D. 30, L.D. 10)
(a) Effect of lower dose is proportionately less
1) At 100 REM only 15% of people develop any symptoms
2) At 25-50 REM no clinical findings are present and the syndrome is only diagnosable by laboratory tests (blood count changes)

**2. ACUTE RADIATION SYNDROME (A.R.S.)
a. Assume a dose of 400 REM (L.D. 50). This dose almost invariably would be from external radiation
b. Smaller doses would show an attenuated A.R.S. both in time and severity of symptoms
(1) Early Phase (1 hour to 2 days)
(a) Nausea plus or minus vomiting
(b) Malaise plus or minus hyperexcitability of reflexes
(2) Asymptomatic Phase (2 hours to 2 days)
(a) Patient feels well but tissue damage is progressing
1) WBC drops during first day; first lymphocytes, then granulocytes to the range of 1000 cells per cc.
2) RBCs and platelets follow in dropping
(b) Internal bleeding
1) G.I.
2) Skin
(3) Height of Disease (2 to 3 weeks)
(a) Elevated temperature in the range of 103-104 degrees
(b) Exhaustion
(c) Weight loss
(d) Reddened skin
(e) Loss of hair
(f) Hemorrhages in skin
(g) Ulcerated mucous membrane
(h) G.I. hemorrhages
(i) Infection, may be ultimate cause of death
(j) Fluid imbalance
(4) Delayed effects in survivors
(a) Hair loss
(b) Cataracts
(c) Anemia
(d) Leukopenia, may go on to Leukemia
(e) Impaired spermatogenesis
(f) Premature aging, shortens life span

E. CHEMICAL/RADIOACTIVE WASTE DISPOSAL
   1. CONTAMINATED WASTE (body substances/secretions, water and other liquids)
      a. Flush into ordinary floor drains and sinks
         (1) Leave faucets turned on to ensure adequate dilution
      b. Wash into outside storm drains
         (1) Leave hose running to wash contaminants into drains
         (2) Be careful not to splash

   2. CONTAMINATED DISPOSABLE SUPPLIES
      a. Place in plastic bag-lined bio-medical waste containers
      b. Label "CONTAMINATED - RADIOACTIVE"
      c. Leave for proper disposal by appropriate personnel
         (1) RSO or his/her designee
         (2) Department of Energy (DOE)

   3. CONTAMINATED EQUIPMENT
      a. Equipment will remain in the Chemical/Radioactive Emergency Area (C/REA) until decontaminated or removed by appropriate personnel
         (1) RSO or his/her designee
         (2) DOE or State Radiological Health

**F. RADIOLOGICAL SURVEY OF INSTRUMENTS
   1. RADIOLOGICAL SURVEY EQUIPMENT INSPECTION
      a. Survey and Dosimeter meters will be inspected and calibrated once a week
         (1) Radiology responsible for the Ludlum survey meter
            (a) Tested weekly and after daily nuclear usage
         (2) EMS and/or County Fire Department responsible for their own CD V-700 survey meters
         (3) Dosimetry system not in place at present
      b. Operational check for the Ludlum survey meter
         (1) Observe battery strength on meter face
         (2) Check audio (Listen for sound)
         (3) Read background readings
            (a) Meter set on 0.1 mR/hr
         (4) Verify accuracy using Cs137 check source (.99mCl)
      c. Operational check for the CD V-700 survey meters (if available)
         (1) Install fresh batteries
            (a) Observe the indicated polarity
         (2) Turn selector switch to the 10 range
         (3) Allow 30 seconds for warm-up time
         (4) Open the probe shield and place the open area directly against the check source
            (a) Needle should move to mid-range (1.5-2.5 mr/hr.)
         (5) Determine the background radiation level
            (a) Set instrument on X-1
            (b) Observe reading for 30 seconds (if fluctuates, average readings)
         (6) Note findings
         (7) Remove batteries and return to storage box (when situation is over)
      d. Operational check for a Dosimeter-Charger

**G. HALF-LIFE OF SELECTED ISOTOPES

Name	Radiation	Symbol	Half-Life	Critical Organ
Americium 241	alpha, gamma	Am241	458 years	bone
Barium 140	beta, gamma	Ba140	12.8 days	bone
Cadium 109	gamma	Cd109	13 days	bone
Calcium 45	beta	Ca45	453 days	liver
Calcium 47	beta, gamma	Ca47	165 days	bone
Carbon 14	beta	C14	5,730 years	total body
Cesium 137	beta, gamma	Ce137	30 years	total body
Chromium 51	gamma	Cr51	28 days	total body
Cobalt 57	gamma	Co57	270 days	total body
Cobalt 60	beta, gamma	Co60	5.3 years	total body
Europium 152	beta, gamma	Eu152	13 years	kidney
Fluorine 18	beta, gamma	F18	2 hours	total body
Gold 198	beta, gamma	Au198	2.7 days	total body
Hydrogen 3 (Tritium)	beta	II3	12 years	total body
Iodine 125	beta, gamma	II25	60 days	thyroid
Iodine 131	beta, gamma	II31	8 days	thyroid
Iodine 132	beta, gamma	II32	2.3 hours	thyroid
Iodine 133	beta, gamma	II33	20.8 hours	thyroid
Iodine 134	beta, gamma	II34	52.5 minutes	thyroid
Iodine 135	beta, gamma	II35	6.7 hours	thyroid
Iron 55	beta, gamma	Fe55	2.6 years	spleen
Lead 210	beta, gamma	Pb210	20 years	kidney
Mercury 197	gamma	Hg197	3 days	kidney
Molybdenum 99	beta, gamma	Mo99	3 days	kidney
Neptunium 239	beta, gamma	Np239	2 days	GE tract
Phosphorus 32	beta	P32	14 days	bone
Polonium 210	alpha	Po210	138 days	spleen
Potassium 32	beta, gamma	K32	12 hours	total body
Promethium 149	beta, gamma	Pm149	2 days	bone
Radium 224	alpha, gamma	Ra224	4 days	bone
Radium 226	alpha, gamma	Ra226	1,600 years	bone
Rubidium 86	beta, gamma	Rb86	19 days	total body
Ruthenium 106	beta	Ru106	368 days	kidney
Sodium 22	beta, gamma	Na22	2.6 years	total body
Strontium 85	gamma	Sr85	65 days	total body
Strontium 90	beta	Sr90	28 days	bone
Technetium 99	beta	Tc99	2E5 years	kidney
Technetium 99m	beta	Tc99m	6 hours	kidney
Thorium 230	alpha, gamma	Th230	8E4 years	bone
Thorium Natural	alpha, beta, gamma	Th	1.4E10 years	bone
Uranium 238	alpha, gamma	U238	4.5E9 years ($x10^9$)	kidney
Uranium Natural	alpha, beta, gamma	U	4.5E9 years	kidney
Zinc 65	beta, gamma	Zn65	245 days	total body
Zirconium 95	beta, gamma	Zr95	66 days	total body

Source: Radiation and Health: Principles and Practice in Therapy and Disaster Preparedness. Aspen, 1984.

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